REMARKS

Claims 1-2, 17 and 27 stand rejected under 35 USC 102(e) as anticipated by Smith; claims 3-5 and 18-20 stand rejected under 35 USC 103(a) as unpatentable over Smith in view of Van Heeswyk; and claims 8-13, 16, 21 and 22 stand rejected under 35 USC 103(a) as unpatentable over Smith in view of Raleigh. The rejections are respectfully traversed.

The present invention relates to a receiver which has at least one receiving antenna. The receiver receives a signal (referred to as the "received signal"). This signal is similar to the user signal (modified by a system matrix which describes distortions of the signal during radio transmission through the air) plus the interference. This is shown by formula (12) in the description and the corresponding explanations regarding formula (12).

Formula (12): $e = A*d + n$, where e is the received signal, d is the user signal and n is the interference signal. A is the system matrix.

The claimed invention uses three different expressions:

- "received user signal" which corresponds to "d" in formula (12). The user signal is a signal aimed at the receiver but not known by the receiver, i.e. the user signal equals data or signaling information for the receiver, the content of which the receiver needs or wishes to know. The fact that the user signal equals information which is not known to the receiver can be seen in the description (referring to the English translation of the German version before amendments):

P. 8,1. 11-16: "The transmitted bursts consist of two data blocks and a midamble arranged between them which provides for the channel estimate at the receiver end. In the text which follows, only the first data block of a burst will be considered in the description of the data detection." The "data blocks" are the same as the user signal, the midamble (which is known by the receiver) can be used to obtain quantitative information about the data blocks. Further, P. 8,1. 28-30: "e contains all samples of the received signals at all Ka antennas which are based on the first data block of the transmitted burst."

- "received interference signal" which corresponds to "n" in formula (12).

- "received signal" which corresponds to "e" in formula (12).

The invention, with reference to the expressions described above, works as follows:

- First, the received signal (e) is used to obtain quantitative information about the received user signal (d). An example how this can be done is given by formula (14) of the description. Here, the quantitative information about the received user signal is called "estimate."

- Second, quantitative information about the received interference signal (n) is obtained using the received signal (e) and the result of the first step, namely the quantitative information about the received user signal (d). An example how this can be done is given by formula (16) of the description. Here, the quantitative information about the received interference signal is called "estimate."

In this regard, a typographical error was found in Formula (16) in the English translation. As can be seen by referring to formula (16) of the German PCT version, there should be a minus sign between the two e's. Hence, the quantitative information about the received interference signal is obtained by subtracting a reconstruction of the received signal (ed), which was obtained using the quantitative information about the received user signal, from the actual received signal (e). Formula (16) has been amended to reflect same.

Third, the result of the second step, namely the quantitative information about the received interference signal (n) is used to generate a directional pattern, which is used by the receiver to transmit signals. The directional pattern therefore is not (or at least not only) generated in order to better decode to-be received signals, but to transmit signals in certain directions. The aim of this procedure of generating the directional pattern for transmission is to reduce interference caused by the wireless station we are looking at to other wireless stations.

Smith (U.S. Patent No. 6,009,124) applies an antenna training sequence (col. 2,1. 21-22; col. 5,1. 8-11; col. 8,1. 33-35; col. 9, I. 4-5; col. 9,1. 15-16) for finding a direction in which to steer antennas. The antenna training sequence is a sequence known to the receiver. (If the receiver would not know the antenna sequence, the method described by Smith would simply not be feasible.) Knowing the content of the training sequence, the receiver calculates the BER (bit error rate) and the RSSI (received signal strength indicator) of the received training sequence. In case the received signal is not good enough regarding the BER and RSSI values of the training sequence, the antenna direction is changed. This is repeated until the reception quality exceeds some threshold.

Smith fails to reveal the following features of the claimed invention:

(1) obtaining quantitative information about received user signals,

(2) obtaining quantitative information about the received interference signal from the received signal and the quantitative information about the received user signal,

(3) generating a directional pattern from the information about the received interference signal, and

(4) generating this directional pattern for transmission.

Addressing (1): As shown above, Smith does not use user signals which are not known by the receiver, but rather a training sequence known by the receiver. Therefore, Smith does not obtain quantitative information about received user signals. The Examiner has interpreted "valid data is transported between BS and MU", step 714 in figure 7, as equivalent to the user signals in the claimed invention. However, the transmission of valid data in figure 7 of Smith takes place after the method of finding the proper direction for the antennas, i.e. the "valid data", which is not known by the receiver, is not a basis for any of the steps having to do with BER, RSSI, antenna steering and so on. This implies Smith having a first phase during which no useful data is transmitted but only training sequences, and this first phase is used to find the proper antenna direction. Only after having found the proper antenna direction can the second phase during which useful data is

transmitted start. In the present invention, on the other hand, the method of generating the directional pattern goes along with the transmission of useful data (i.e. the user signal). Hence, there is no "break" (like Smiths first phase) or extra training sequences required.

Addressing (2): Smith uses the BER (bit error rate) and the RSSI (received signal strength indicator). Smith does not disclose obtaining quantitative information about the received interference signal. Even if one purports that the RSSI somehow implicitly contains information about the received interference signal, this information is definitely not obtained in a way similar to the claimed invention obtains the quantitative information about the received interference signal, namely from the received signal and the quantitative information about the received user signal. In contrast, Smith uses the training sequence to obtain the RSSI.

Addressing (3): According to the claimed invention, the information about the received interference signal is used to generate a directional pattern. The BER and RSSI are used by Smith not to generate a directional pattern, but to bring about a decision whether to change the direction of the antenna or not. This is shown in figure 3. If BER is higher than a predetermined threshold and/or RSSI is lower than a predetermined threshold, then in step 318 the antenna is steered a predetermined amount, e.g. 22.5 degrees (col. 5,l. 23-26). After having steered the antenna, the values of BER and RSSI are checked again and compared with the thresholds. This method corresponds to trial and error. The antennas direction is changed by steering the predetermined amount until BER and RSSI are satisfactory (col. 5, l. 62: "scan the antenna array"). That means that BER and RSSI are only decision parameters, whereas in the claimed invention, from the information about the received interference signal, a directional pattern can be directly obtained, e.g. by calculation which is shown by the formulas in the description.

Addressing (4): The steering process of Smith tries to guarantee that a certain signal quality for the reception of signals can be maintained (e.g. col. 7,1. 24-33, col. 9,1. 28-32, col. 10, l. 12-18, col. 10, l. 26-30, col. 10, l. 39-43). The Examiner purports that "the quantitative values of both BER rate and RSSI are utilized to improve the quality of the transmission of the data

transmission," but nowhere does Smith mention steering the antennas for better transmission. The only goal is to change the antenna direction for reception.

For understanding the differences between Smith and the instant application, it should be stressed that Smith uses the training sequence known by the receiver, while the instant invention uses the user signal which is not known by the receiver. This difference automatically enforces a different approach for finding a proper antenna direction, as of course Smith does exploit the receivers knowledge of the antenna training sequence.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no. 449122009400. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Dated: March 22, 2004

Respectfully submitted,

By _____

Kevin R. Spivak
Registration No.: 43,148
MORRISON & FOERSTER LLP
1650 Tysons Blvd, Suite 300
McLean, Virginia 22102
(703) 760-7762 - Telephone
(703) 760-7777 - Facsimile